

## WHAT IS CLAIMED IS:

1. A method of producing a semiconductor device comprising the steps of:  
forming a semiconductor layer by  
    forming a first plurality of atomic layers of a semiconductor on a substrate;  
    forming a first atomic layer of a non-semiconductor on said plurality of  
atomic layers of a semiconductor;  
    forming a second plurality of atomic layers of a semiconductor on said  
atomic layer of said non-semiconductor; and  
    forming a second atomic layer of a non-semiconductor on said second  
plurality of atomic layers of a semiconductor;  
    forming at least one p-type region in or directly adjacent to said  
semiconductor layer;  
    forming at least one n-type region in or directly adjacent to said  
semiconductor layer; and  
    forming a plurality of electrodes.
2. A method according to claim 1 wherein said step of forming a first plurality  
of atomic layers of a semiconductor on a substrate comprises the step of forming  
a plurality of atomic layers of a silicon on a substrate.
3. A method according to claim 1 wherein said step of forming a first plurality  
of atomic layers of a semiconductor on a substrate comprises the step of forming  
fewer than eight atomic layers of said semiconductor on a substrate.
4. A method according to claim 1 wherein said step of forming a first plurality  
of atomic layers of a semiconductor on a substrate comprises the step of forming

on a substrate a plurality of atomic layers of a semiconductor selected from the group of: Group IV semiconductors, Group VI semiconductors, Group III-V semiconductors, and Group II-VI semiconductors.

5. A method according to claim 1 wherein said step of forming a first plurality of atomic layers of a semiconductor on a substrate comprises the step of forming on a substrate a plurality of atomic layers of a semiconductor selected from the group of Si, Ge, SiGe, GaAs, InP, InAs, GaP, GaN, GaSb, CdS, and CdSe.

6. A method according to claim 1 wherein said step of forming a first atomic layer of a non-semiconductor on said plurality of atomic layers of a semiconductor comprises the step of forming a first atomic layer of oxygen on said plurality of atomic layers of a semiconductor.

7. A method according to claim 1 wherein said step of forming a first atomic layer of a non-semiconductor on said plurality of atomic layers of a semiconductor comprises the step of forming on said plurality of layers of a semiconductor a first atomic layer of one or more selected from the group of: oxygen, nitrogen, fluorine, and CO.

8. A method of forming a semiconductor structure comprising the steps of:  
forming first, second, third and fourth atomic layers of silicon;  
forming a fifth atomic layer of oxygen on said fourth atomic layer of silicon on a substrate; and  
forming sixth, seventh, eighth, and ninth atomic layers of silicon on said fifth atomic layer of oxygen.  
forming a tenth atomic layer of oxygen on said ninth atomic layer of

silicon.

9. A method of forming a channel region comprising the steps of:  
forming first, second, third and fourth atomic layers of silicon;  
forming a fifth atomic layer of oxygen on said fourth atomic layer of silicon;  
and  
forming sixth, seventh, eighth, and ninth atomic layers of silicon on said fifth atomic layer of oxygen.

10. A method of forming a high-conductivity region comprising the steps of:  
forming a first plurality of atomic layers of a semiconductor on a substrate;  
forming a first atomic layer of a non-semiconductor on said plurality of atomic layers of a semiconductor;  
forming a second plurality of atomic layers of a semiconductor on said atomic layer of said non-semiconductor; and  
forming a second atomic layer of a non-semiconductor on said second plurality of atomic layers of a semiconductor.

11. A method according to claim 9, wherein said high-conductivity region is a channel region.